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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/085,052	03/01/2002	Tatsuhiko Okada	0234-0442P	8158

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EXAMINER
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DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 08/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/085,052

Applicant(s)

OKADA ET AL.

Examiner

Tracy Dove

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,8,11,13-15,18 and 21-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,8,11,13-15,18 and 21-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/17/05.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: IDS 8/2/05.

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 6/8/05. Applicant's arguments have been considered, but are not persuasive. Claims 1, 3-5, 8, 11, 13-15, 18 and 21-23 are pending. This Action is made FINAL, as necessitated by amendment.

#### ***Claims Analysis***

The limitation "accommodated to an apparatus" in claims 1 and 13 is not given patentable weight because it does not further limit the claimed fuel cell and is an intended use limitation. The limitation "attached to a portable device" in claims 5 and 15 is not given patentable weight because it does not further limit the claimed fuel cell and is an intended use limitation. The claims are directed to a fuel cell (not an apparatus comprising the fuel cell or a portable device attached to the fuel cell).

#### ***Claim Objections***

Claims 1 and 13 are objected to because of the following informalities: the claims recite "a hollow or cavity", which is confusing. Examiner suggests "a hollow cavity". Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

the disclosed invention is inoperative and therefore lacks utility. See 35 USC 112, 1<sup>st</sup>, rejection below regarding the closed language "consisting essentially of" in claims 1 and 13.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

Art Unit: 1745

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3-5, 8, 11 and 22 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a tubular polymer electrolyte *membrane* having an inner diameter of 0.2-10 mm, an outer diameter of 0.5-12 mm and a length of 20-1000 mm, does not reasonably provide enablement for a fuel cell having a hollow or cavity having a diameter in a range of 0.2-10 mm, an outer diameter of the fuel cell having a range of 0.5-12 mm and a length of the fuel cell having a length of from 20-1000mm. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. The specification discloses the claimed diameters and length only for the polymer electrolyte membrane of the fuel cell. The fuel cell includes a fuel electrode, an air electrode and a membrane between the fuel electrode and the air electrode. Claims 1, 3-5, 8, 11 and 22 contain new matter.

Claims 1, 3-5, 8, 11, 13-15, 18 and 21-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites "the combination of the carbon particle material and the tubular polymer electrolyte membrane brings about a flexibility of the fuel cell", which is not supported by the specification as filed. Claim 13 recites "the combination of the catalyst and the tubular polymer electrolyte membrane brings about a flexibility of the fuel cell", which is not supported by the specification as filed.

Art Unit: 1745

Claims 1, 3-5, 8, 11, 13-15, 18 and 21-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 1 and 13 recite the closed language "consisting essentially of". The transitional phrase "consisting essentially of" limits the scope of a claim to the specified materials and those that do not materially affect the basic and novel characteristics of the claimed invention. MPEP 2111.03. Claims 1 and 13 each recite "wherein methanol is introduced as the fuel into the hollow or cavity of the fuel cell to obtain an output power", which is not enabled because the closed language claim does not require an oxidant for the air electrode. An output power of the claimed fuel cell cannot be obtained without both a fuel being provided to the fuel electrode and an oxidant being provided to the air electrode. Furthermore, the fuel cell would require a manifold structure to separately deliver the fuel and the oxidant and current collectors/terminals.

Claims 22 and 23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 13 recite "wherein the fuel cell is flexible to be accommodated to an apparatus and operates at a temperature to cause output of electric power at 100°C or less", which does not appear to be supported by the specification as filed. The specification states "the fuel cell of the present invention has high output density and low operating temperature of as low

as 100°C (page 12). The phrase “as low as 100°C” is equivalent to 100°C or greater, not 100°C or less.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 3-5, 8, 11, 13-15, 18 and 21-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the remaining electrode". There is insufficient antecedent basis for this limitation in the claim.

Claim 1 recites the limitation "the combination of the carbon particle material and the tubular polymer electrolyte membrane". There is insufficient antecedent basis for this limitation in the claim.

Claim 3 recites “said tubular polymer membrane has a catalyst layer deposited or coated on a surface thereof”, which is inconsistent with the closed language (consisting essentially of) of claim 1. One of skill would have known that an additional catalyst layer would materially affect the basic and novel characteristics of the claimed fuel cell.

Claim 4 recites “an oxidizer is brought into contact with said air electrode”, which is inconsistent with the closed language (consisting essentially of) of claim 1. One of skill would have known that an oxidizer would materially affect the basic and novel characteristics of the claimed fuel cell.

Art Unit: 1745

Claim 13 recites "a catalyst layer deposited or coated on both surfaces of the tubular polymer electrolyte membrane", which is indefinite. It is unclear how "a catalyst layer" (single layer) is present on "both surfaces" (two surfaces) of the membrane.

Claim 13 recites the limitation "the combination of the catalyst and the tubular polymer electrolyte membrane". There is insufficient antecedent basis for this limitation in the claim.

Claim 14 recites "an oxidizer is brought into contact with said air electrode", which is inconsistent with the closed language (consisting essentially of) of claim 1. One of skill would have known that an oxidizer would materially affect the basic and novel characteristics of the claimed fuel cell.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-5, 8, 11, 13-15, 18 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bass et al., US 6,001,500 in view of Muthuswamy et al., US 6,060,188.

Bass teaches a cylindrical (tubular) fuel cell comprising an anode containing an anode catalyst, a polymer electrolyte membrane and a cathode containing a cathode catalyst. The polymer electrolyte is between the anode and the cathode (abstract). The anode and cathode are gas diffusion electrodes preferably comprising carbon materials such as graphite, carbon fiber and carbon cloth (col. 2, lines 30-46). Catalyst particles are deposited onto the electrode surface and the particles may be a noble metal catalyst on carbon (col. 2, line 66-col. 3, line 3). The

Art Unit: 1745

catalyst material is applied to the outside of the inner electrode (contacts polymer electrolyte) (col. 3, lines 28-33). The electrode and catalyst material may be applied directly to the membrane (col. 5, lines 5-7). Hydrogen gas contacts the anode (fuel electrode) and oxygen gas contacts the cathode (air electrode) (col. 8, lines 1-15). Each fuel cell is assembled using five layers (col. 4, lines 6-52). Figure 2 shows the cathode is provided on the outer surface of the membrane and the anode is provided on the inner surface of the membrane. The membrane has an inner diameter of up to about 2.16 mm and a thickness of 0.13 mm or less. The thickness is preferably about 0.09 mm (outer diameter of the membrane is  $2.16+0.09=2.25$  mm). Table 1 teaches the polymer electrolyte membrane fuel cell has a length of 25 cm (250 mm). The fuel cell may be used as a source of power for transportation (col. 1, lines 18-19). Bass teaches the absolute maximum temperature for a polymer electrolyte membrane fuel cell is 100°C. To avoid drying of the membrane, industry practice is to operate between 71-83°C (9:47-52).

Bass does not explicitly state the fuel on the inner side of the membrane is methanol.

However, Muthuswamy teaches a cylindrical fuel cell having a cathode 23, a cathode catalytic layer 24, a polymer electrolyte 25, an anode catalytic layer 26 and an anode 27 (abstract). The anode is located on the outer side of the membrane and the cathode is located on the inner side of the membrane (Figure 2). Alternatively, the anode 37 may be located on the inner side of the membrane and the cathode 33 located on the outer side of the membrane (Figure 3). The catalyst layer is present on the side of an electrode that faces the electrolyte. Oxidant is evenly distributed to the cathode and fuel is allowed to pass to the anode (col. 3, lines 52-67). Methanol may be used as the fuel (4:17-20) and the membrane may be a perfluorosulfonic acid material (3:38-51).



Art Unit: 1745

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Muthuswamy teaches it is known in the art that tubular polymer electrolyte membrane fuel cells (PEMFC) may use methanol as the fuel. One of skill would have been motivated to use hydrogen or methanol as the fuel for the tubular PEMFC of Bass because Muthuswamy teaches hydrogen or methanol may be used as the fuel along with air as the oxidant (4:17-20). Both Bass and Muthuswamy are directed toward tubular/cylindrical fuel cells.

### ***Response to Arguments***

Applicant's arguments filed 6/8/05 have been fully considered but they are not persuasive.

Applicant argues claims 1, 5, 13 and 15 have been amended to positively recite limitations that are not conditional intentions to use. Examiner disagrees. The claims are directed to a fuel cell. Since a fuel cell cannot "comprise" the apparatus or portable device that it is accommodated in or attached to, these limitations are not given patentable weight.

Applicant asserts the specification, at page 16, lines 6-10, states: "The fuel cell of the present invention is easy to miniaturize, has high output density, and operates at a low temperature *as low as 100°C or less*, so that it is expected to have a long term durability and is easy to handle". However, the specification does not recite such language. The specification, at page 12, lines 14-16, recites "The fuel cell of the present invention has high output density and low operating temperature of *as low as 100°C*".

The 35 U.S.C. 102(b) rejection of claims 13-15, 18 and 21 is withdrawn because claim 19 has been incorporated into claim 13

Art Unit: 1745

Regarding the 35 USC 103(a) rejection, Applicant argues Bass fails to disclose or suggest the fuel cell uses a methanol fuel. However, Muthuswamy has been combined with Bass to reject the claims as obvious. Muthuswamy teaches methanol may be used as the fuel and one of skill would have been motivated to use hydrogen or methanol as the fuel for the tubular PEMFC of Bass because Muthuswamy teaches hydrogen or methanol may be used as the fuel along with air as the oxidant (4:17-20). Applicant has not addressed the motivation statement provided by the Examiner. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant further argues Bass fails to disclose a fuel cell having the claimed dimensions. However, Applicant appears to be confused as to the dimensions of the fuel cell (as a whole unit) versus the dimensions of the polymer electrolyte membrane (element of the whole unit). The present specification only discloses diameters (inner and outer) for the polymer electrolyte membrane, not the entire fuel cell. Therefore, when Applicant refers to Table 1 of Bass to show that the claimed invention is not taught by the reference, Applicant is improperly comparing the prior art and the claimed invention. Table 1 of Bass teaches diameters of the fuel cell, not diameters of the polymer electrolyte membrane alone. Bass teaches the membrane has an inner diameter of up to about 2.16 mm and a thickness of 0.13 mm or less. The thickness is preferably about 0.09 mm (outer diameter of the membrane is  $2.16 + 0.09 = 2.25$  mm). Table 1 teaches the polymer electrolyte membrane fuel cell has a length of 25 cm (250 mm).

Art Unit: 1745

Applicant argues the presently claimed fuel cell can operate even with a thickness of 0.2 mm. This is not supported by the specification as filed. Again, the dimensions taught by the present specification are for the membrane alone, not the entire fuel cell.

Applicant further argues the present invention adopts a novel laminar construction having carbon particles with catalyst loaded and/or catalyst being laminated on the surface of the PEM. However, the claimed invention does not require a "laminar construction". The claimed invention does not exclude a "solid" membrane. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "laminar construction"; "solid membrane") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Furthermore, both the instant invention (Example 1) and the prior art teach (Bass; 4:29-32) perfluorosulfonic acid-type polymers are used for the polymer electrolyte membrane. Therefore, it is unclear how Applicant reaches the conclusion that the membrane of the present invention is flexible, but the membrane of the prior art (Bass) is not flexible. Therefore, Bass does not teach away from the claimed invention.

Applicant argues the fuel cell of Muthuswamy is not flexible because the fuel cell has a rigid central core. However, rigid does not equate to non-flexible. Furthermore, Muthuswamy teaches the fuel cell has a variable cross section (flexible) for creating a fuel cell **that can fit easily into a contoured package** (3:8-12). Muthuswamy never states the fuel cell is non-flexible, as asserted by Applicant.

Art Unit: 1745

Applicant states Bass has an operating temperature at about 200°C. This is incorrect. See column 9, lines 47-52 of Bass.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1745

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**TRACY DOVE**  
**PRIMARY EXAMINER**

August 12, 2005